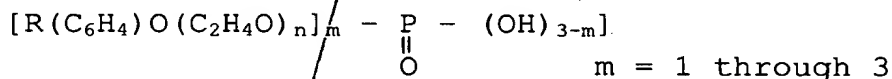


CLAIMS

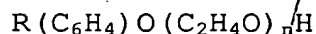
1. An electroless copper plating liquid for forming a thin film copper interconnection for a semiconductor device having a filled interconnection structure, characterized by containing dihydric copper ions, a complexing agent, an aldehyde acid, and an organic alkali.

2. An electroless copper plating liquid according to claim 1, characterized by further containing polyoxyethylene alkylphenylether phosphoric acid and/or polyoxyethylene alkylphenylether, which has the structure indicated below, at a concentration ranging from 1 to 100 mg/L:

(polyoxyethylene alkylphenylether phosphoric acid)



(polyoxyethylene alkylphenylether)

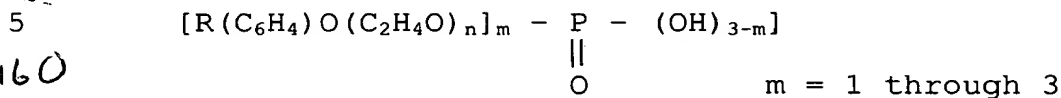


3. An electroless copper plating liquid according to claim 1, characterized in that said complexing agent comprises EDTA·4H (ethylenediaminetetraacetic acid), said aldehyde acid comprises a glyoxylic acid, and said organic alkali comprises TMAH (tetramethylammonium hydroxide).

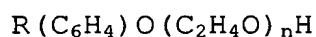
4. An electroless copper plating liquid according to claim 4, characterized in that said copper ions have a

alkylphenylether phosphoric acid and/or polyoxyethylene alkylphenylether, which has the structure indicated below, at a concentration ranging from 1 to 100 mg/L:

(polyoxyethylene alkylphenylether phosphoric acid)



(polyoxyethylene alkylphenylether)



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~~8.~~ ⁴ A method of forming a copper interconnection according to claim ¹~~8~~, characterized in that said complexing agent comprises EDTA·4H (ethylenediaminetetraacetic acid), said aldehyde acid comprises a glyoxylic acid, and said organic alkali comprises TMAH (tetramethylammonium hydroxide).

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~~9.~~ ⁵ A method of forming a copper interconnection according to claim ¹~~8~~, characterized in that said copper ions have a concentration ranging from 0.01 to 10.0 g/L, said EDTA·4H has a concentration ranging from 0.5 to 100 g/L, said glyoxylic acid has a concentration ranging from 1 through 50 g/L, and the electroless copper plating liquid has a pH adjusted to a range from 10 to 14 by said TMAH.

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~~10.~~ A method of forming a copper interconnection on a semiconductor device, characterized by performing an electroless copper plating process at a plating rate of 50 nm/min. or less using said electroless copper plating

concentration ranging from 0.01 to 10.0 g/L, said EDTA·4H
has a concentration ranging from 0.5 to 100 g/L, said
glyoxylic acid has a concentration ranging from 1 through 50
g/L, and the electroless copper plating liquid has a pH
5 adjusted to a range from 10 to 14 by said TMAH.

Sub
A2

5. A method of forming a copper interconnection
on a semiconductor device, characterized by the steps of
forming an auxiliary seed layer for reinforcing a copper
10 seed layer in an interconnection groove defined in a surface
of the semiconductor device using an electroless copper
plating liquid containing dihydric copper ions, a complexing
agent, an aldehyde acid, and an organic alkali, and
performing an electrolytic plating process using the seed
15 layer including said auxiliary seed layer as a current
feeding layer, for thereby filling copper in the
interconnection groove defined in the surface of the
semiconductor device.

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20 6. A method of forming a copper interconnection
according to claim 5, characterized by performing an
electroless copper plating process at a plating rate of 50
nm/min. or less using said electroless copper plating
liquid.

3
25 7. A method of forming a copper interconnection
according to claim 5, characterized in that said electroless
copper plating liquid contains polyoxyethylene

liquid.

11. A method of forming a copper interconnection on a semiconductor device, characterized by plating copper on a surface of a semiconductor substrate using an electroless copper plating liquid containing dihydric copper ions, a complexing agent, an aldehyde acid, and an organic alkali.

12. A method of forming a copper interconnection according to claim 11, characterized by performing an electroless copper plating process at a plating rate of 50 nm/min. or less.

Add A3

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